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JPRS Report

Nuclear Developments

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HONG KONG

Medics Seek Say on Plans Involving Daya Bay Plant

51400006 Hong Kong *SOUTH CHINA MORNING POST* in English 6 Feb 88 p 2

[Article by Andy Ho]

[Text] The Federation of Medical Societies of Hongkong has asked the Chief Secretary, Sir David Ford, to appoint a professional from among their ranks to oversee local future plans relating to the Daya Bay nuclear power project.

The federation, a coalition of 63 medical groups, said a central coordinating body led by the medical profession was vital in ensuring that Daya Bay safety measures would not be compromised because of political and economic pressure.

The medical community's demand comes weeks before the government is to make public its contingency measures for Hongkong in case of a major mishap at Daya Bay.

Dr Huang Chen-ya, the federation's president, said they had made their demand in a letter to Sir David late last week.

Copies of their proposals were sent to the Medical and Health Department and the Legislative Council's ad hoc group on Daya Bay.

The federation told Sir David that many of the Daya Bay issues had not been fully discussed by the parties involved until now.

It pointed to the need for a central body to coordinate the many government departments that would be involved in radiation-related matters arising from the \$28.8 billion Sino-Hongkong nuclear joint-venture.

The medical professionals were concerned about how to ensure that officials would not bow to political or economic pressure and accept otherwise unacceptable radiation levels.

They told Sir David: "It appears more appropriate to have the medical profession which is bound by medical ethics to direct the proposed government body."

This was the best way, they argued, to make sure that the formulating and implementation of plans on Daya Bay would not be dominated by political and economic concerns.

Among the 23-year old federation's members are the Hongkong Medical Association, the Society of Physicians of Hongkong, and the local branch of the British Medical Association.

In an internal circular to its members dispatched before they wrote to Sir David, the federation's executive committee complained of little access to technical data on the nuclear power plant, now being built about 50 km from Hongkong.

"Since scientific details of the Daya Bay nuclear reactors are restricted, we are unable to make accurate estimations or calculations of various radiation dose," they said.

They also questioned the effectiveness of communication between the local and the Chinese Government in an emergency.

The federation further proposed that "some form of education on the management of the public at large suffering from an increased background radiation, or a nuclear fall-out, be provided to medical practitioners some time before the commissioning of the Daya Bay Nuclear power plant.

The first of the two 900 mega-watt Daya Bay nuclear reactor units is scheduled to come on stream by late 1992.

/12232

BRAZIL

Brazil, Argentina Will Join London Suppliers Club

51002017 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Mar 88 p 5

[Text] Brazil and Argentina do not intend to join the London Suppliers Club, a group comprised of the countries that have already mastered nuclear technology. The position of the two countries was announced on 1 March by Rex Nazareth Alves, president of the Brazilian National Nuclear Energy Commission [CNEN], and Ema Perez Ferreira, president of the National Commission for Atomic Energy of Argentina, during an interview at CNEN Headquarters in Rio.

Professor Rex Nazareth noted the pressures that Brazil already suffered through the London Suppliers Club when it did not yet have a mastery of nuclear energy, which became possible through the autonomous project, also known as the "parallel" project, developed by the CNEN and the Navy.

Among other points, the two presidents agreed that "the United States and the Soviet Union are the owners of the London suppliers Club keys." A closed club, inspired in the nuclear weapons non-proliferation treaty, the London Suppliers Club was created in the 60s by the two superpowers, but Brazil did not even recognize it in the UN General Assembly meeting of October 1967.

The president of the CNEN said that "if in the petroleum sector there was the creation of OPEC [Organization of Petroleum Exporting Countries], in the nuclear area the situation has been more complicated: there is the London Suppliers Club, formed for a dual purpose—as much for the control of the material as for the control of the technology. Thus it constitutes an attempt, under the pretext of avoiding proliferation (of nuclear weapons), to maintain the oligopoly of nuclear technology."

"I hope that Brazil does not ever intend to join this club. The members of the Club are the United States, the Soviet Union, the Netherlands, Great Britain and Japan, practically all the industrialized nations that have a mastery of nuclear energy," Rex Nazareth added.

The presidents of the commissions also emphasized the cooperation developed between the two countries in the field of nuclear energy. Through the cooperation, there may even be developed a project for the production of a fast breeder reactor, which may be possible within a few years. The cooperation, according to Rex Nazareth Alves, will be complementary in its most significant aspects."

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Aramar Experimental Center To Produce Enriched Uranium

51002014a Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 Feb 88 p 2

[Article by Helio Contreiras: "Aramar Will Be Operating by August"]

[Text] Brazil will be producing enriched uranium by the ultracentrifuge process by the end of June. The work is being carried out at the Aramar Experimental Center in Ipero, Sao Paulo, where an independent Brazilian nuclear program has been developed. "Even during this semester, we will be able to ensure adequate supplies of radioisotopes to 1,700 clinics," Admiral Othon Luiz Pinheiro da Silva, who heads the program, said. According to him, mastery of ultracentrifuge technology is part of the project to build a Brazilian nuclear submarine.

The technology will be applied by civilian and military researchers from the Aramar Experimental Center, where Brazil's independent nuclear program is being developed. It is an area of restricted access located in the Sao Paulo municipality of Ipero, considered by the International Atomic Energy Agency as one of the nuclear facilities furthest removed from an urban center.

"We cannot look at and analyze this solely from the standpoint of our plans for a nuclear-propelled submarine," declared Adm Othon Luiz Pinheiro da Silva, the person directly responsible for the program. Known for his administrative talent, he pointed out that the most important aspect will be the benefits offered to society. "The independent program will make it possible for the country to ensure adequate supplies of radioisotopes to 1,700 clinics. At present, the only reactor in Brazil producing radioisotopes is the IEA-R1 of the Nuclear Research Institute (IPEN)."

According to the admiral, IPEN's reactor has been operating for the past several years at only one shift a day, because of problems in obtaining radioisotopes. And this has affected clinics which need the material for diagnosis of cancer, heart disease and other conditions. Othon Pinheiro is therefore emphatic when he says: "This independent program is Brazil's refusal to go down on its knees. It represents our conviction that through work and humility, without abusing government spending, we can gradually provide our society with a standard of living similar to that of other countries."

Satisfied with the progress achieved, the admiral predicts that Aramar Experimental Center will be incorporating IPEN's first zero-power reactor by the beginning of the second half of the year. "This will make it possible for the national scientific community to validate experimentally its own calculations, in terms of the physics of reactors," he explained, adding that "zero power reactors consume the energy they produce; they do not generate heat, but do supply radioisotopes."

Although focusing on the technological aspects of the independent nuclear program, Admiral Othon acknowledges that the submarine project is part of the studies on nuclear development using the ultracentrifuge process. He believes that it is natural for the Navy to be planning to have nuclear submarines in the next few years.

"A country with a coastline like Brazil's cannot remain without nuclear submarines. If it did, it would not have what could be called a navy, but only a first-class coastguard," the admiral said, pointing out that the reactor and all its systems were completely designed by Brazilian technicians. As a Brazilian, he believes that "the project is gratifying, because it shows our growing independence in the nuclear power sector. As an engineer, it is important because our country has few projects in the field of mechanical energy. If we were to make a careful evaluation, we would find that nearly all the equipment used in various activities in our society was designed and planned in another country."

Near the Aramar Experimental Center there is a sign on which the slogan of the Office for Coordinating Special Projects appears: "Brazil: developing its own technology and independence." And close to the future nuclear facilities there is a garden which helps feed an orphanage and Navy staff. Two buildings have nearly been completed: the building for the zero power reactor, for training, and the one for the first unit of the uranium isotopic enrichment pilot plant. On the same site construction is underway for a steam components testing station and an ultracentrifuge components factory.

Ultracentrifuging

Isotopic enrichment of uranium is the most difficult phase of the nuclear fuel cycle. More economical than other known processes, ultracentrifuging is also a highly sophisticated method. By way of a simple explanation, Admiral Othon said that "it is a family-size gyroscope that has a series of complexities. It is a multidisciplinary process that involves knowledge of materials and fine mechanics, and the dynamics of rotating bodies, among other things."

With uranium enrichment technology assured and the Aramar Experimental Center operating, the Brazilian government will be able to choose between the two facilities that have mastered atomic technology to generate power at relatively low costs: Aramar and Nuclebras. The decision will not be an easy one. Resistance is expected, since any shift in Brazilian nuclear policy will run up against national and foreign political and professional interests, as well as economic interests.

Editorial Lauds Nuclear Accord With PRC 51002014b Rio de Janeiro O GLOBO in Portuguese 18 Jan 88 p 4

[Text] The Agreement for Peaceful Cooperation in the Area of Nuclear Energy has been signed between Brazil and the People's Republic of China. This agreement satisfied mutual aspirations for scientific and technological development, which is essential to and supports other economic and social development, without jeopardizing objectives nurtured by both countries in different ways to promote a true peace in the world.

A cooperation agreement is always welcome, since it presupposes meeting, dialogue and understanding, it links countries through work, and it signifies a joint effort for progress. It is an antidote to the absolute power of states, which so frequently in history has led to arrogance and has aroused and fostered warlike tendencies. This is especially true when it is a public agreement, concluded on the basis of legal instruments available to all.

Besides being welcome in principle, this agreement signed with the People's Republic of China is well-advised because it makes it possible to bring together elements in a position to be united in Brazil and China. We both have large quantities of the existing thorium reserves in the world. We both have enormous problems which call for establishing a broad and diversified energy matrix. And we have both accumulated in a relatively short time the vital critical mass needed for major solutions. It is therefore natural that we would be open to cooperation.

This mutual assistance aimed at shortening the development process is more than opportune. And we can only greet with confidence the willingness expressed by the People's Republic of China to transfer to Brazil technology it has mastered in building relatively low-cost, high-production nuclear reactors. Energy produced by thorium reactors costs 50 percent less and yields 70 percent of the energy produced by conventional uranium reactors. Anything is commendable that will help prevent the energy shortages that have been threatening the entire world every since we began noticing the growing depletion of nonrenewable and wastefully exploited energy sources.

And there is no suggestion of cooperation between the two countries for military purposes; this is not part of the agreement and runs counter to already established positions. There is no reason to raise this hypothesis in connection with the cooperation agreement with China. Theoretically, the very same question could be raised with regard to any cooperation agreement signed in the nuclear energy field. Nor is there any reason to single out China among other countries as giving priority to problems of strategy and defense.

There are therefore no reservations in principle to be made with regard to the agreement between Brazil and the People's Republic of China. Divergent political systems and ideologies do not fully obstruct possibilities for understanding on fundamental needs for survival and development. And as for circumstantial reservations, it is premature to express them when the agreement has only just taken effect.

When there is a common, urgent cause, it is time to join forces, with whomsoever wishes to join forces.

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INDIA

Envoy to U.S. Refutes Report on Nuclear Weapons

BK211554 Delhi Domestic Service in English
1543 GMT 21 Mar 88

[Text] The Indian ambassador to the United States, Mr P. K. Kaul, has dismissed as a figment of imagination a Western news agency report that India possesses 20 or more nuclear bombs. UPI, quoting former National Security Council members and congressional staff, reported on Sunday that India has assembled a handful of highly sophisticated low-yield atomic bombs that could be delivered at targets by combat aircraft.

MP Notes Turkish Nuclear Equipment to Pakistan

BK231559 Delhi Domestic Service in English
1530 GMT 23 Mar 88

[Text] In the Rajya Sabha today, the government's attention was drawn to reports that Turkey is supplying highly sophisticated and sensitive equipment to Pakistan for its clandestine nuclear programs. Raising the issue, Mr Kapil Verma, Congress-I, said the government should take up the matter with the Turkish Government and persuade it to give up its supply of strategic nuclear equipment.

Papers Report, Comment on Nuclear Sub From USSR

Commissioning by Gandhi

51500129 New Delhi PATRIOT in English 4 Feb 88 p 5

[Text] Visakhapatnam, Feb 8 (UNI, PTI)—Prime Minister Rajiv Gandhi today commissioned India's first nuclear-powered submarine and declared that "we have ensured safe environmental and radiation protection."

Mr Gandhi personally received the submarine INS Chakra at an impressive ceremony here and said particular attention to the management of nuclear waste material had been given.

He said there would be periodic audit of waste material thus setting aside any apprehensions that spent fuel could cause any radiation hazards.

With the commissioning of the submarine the Indian Navy becomes the second one in Asia after the Chinese to have nuclear-powered submarines in its fleet to give it the true water capability.

With the displacement of 5,100 tonnes while submerged, the INS Chakra is on lease to the Indian Navy from the Soviet Navy. The Prime Minister said the Soviet gesture marked a milestone in Indo-Soviet cooperation in the field of defence.

Built at the admiralty yard at Leningrad, the Victor I class submarines, which entered service in 1968, boats an armament of 24 torpedoes which are fired through six 21-inch torpedo tubes.

However both the Soviet and Indian Defence Ministry have clarified that the INS Chakra would not be carrying any nuclear warheads. Designed purely as an attack submarine for both anti-submarine and anti-ship roles, Victor I SSN submarine was the first of its kind having an albacore hull form, a new reactor system and a new generation design shared by the more modern charlie class nuclear submarines.

With the speed of 32 knots when submerged, the INS Chakra has a snoop ray radar and carries a complement of 90 sailors. It also has additional standby two steam turbines. INS Chakra also has a very low frequency buoy and self floating radar, while surfaced it communicates through two very high frequency and uniform frequency aeriels.

Besides China, only the Soviet Union, the United States, France and British navies possess the nuclear-powered submarines and now India joins this exclusive club.

According to the Jane defence weekly, India might get a few of the more state of art Victor III class submarines in another three or four years. The weekly also speculates that two to four Charlie II SSGN submarines might also be given by the Soviets to India. The Charlie II were capable of carrying Cruise missiles.

Victor III submarines are the front line subs of the Soviet Navy and were commissioned in 1979 and are still being commissioned. With the addition of the INS Chakra, the Indian submarine fleet strength has risen to fourteen.

Besides the Chakra, the Indian Navy has eight Foxtrot class Soviet submarines acquired in late sixties, three Soviet kilo class submarines specially built for long range patrols with advanced technology teardrop hulls which represents quantum jump for the Indian Navy.

The kilo class submarine has wide-bodied hulls which muffle engine noises and make detection difficult. It has eight torpedo tubes which can fire 16 torpedoes.

The Indian Navy has also acquired two SSK class submarines from West Germany with two more being built indigenously at the Mazagaon docks. The SSK class have purely the anti-submarine kill role.

Doubts Over Safety

51500129 Calcutta THE STATESMAN in English
30 Jan 88 p 1

[Article by Raju Santhanam]

[Text] New Delhi, Jan 29—A Soviet nuclear-powered submarine, India's latest acquisition and the first of its kind in the country, which left Soviet waters about a fortnight ago, is likely to surface in India amid doubts about the wisdom of deploying it in Indian waters.

According to reports from Moscow, no details were released about the class of submarine that was handed over at a formal ceremony at the eastern port of Vladivostok three weeks ago. The Jane's Defence Weekly had speculated that the submarine could be of the "Victor" or the Sierra class.

Reliable sources say that no authoritative information has been released because the submarine is of the Charlie class. Knowledgeable experts in the West have referred to this class of submarines as the "Chernobyl class" because of its safety record.

This class of submarine is about 20 years old, which in terms of nuclear technology makes it an antique. Although this leased submarine is not carrying nuclear weapons, it is nuclear-powered and as such has a history of nuclear related design flaws that have proved fatal to Soviet crew.

A better-known incident relating to it occurred in June 1983. The Chernobyl class submarine sank near Petropavlovsky off the coast of Kamchatka peninsula. In that incident, most of the 90 members of the crew perished.

The Soviet authorities did not release details of the incident but it was reported that a nuclear reactor failure and the fear of nuclear contamination of Soviet port authorities in the event of it being permitted back into the harbour forced the submarine to remain off shore. Before the problem could be attended to, it sank with its crew.

When it reaches India, the submarine is expected to be berthed at Visakhapatnam. Experts say that measures for decontamination of nuclear wastes have not been adopted. Nuclear wastes must be purged periodically from this submarine, it is pointed out. This routine maintenance work requires careful collection of the wastes and storage at well-guarded treatment facilities. Adequate precautions are necessary, particularly because this class of submarine has a history of nuclear reactor failure problems.

During recent years a number of news reports have described other Chernobyl class defects which include reactor failures and inadequate shielding on board the vessel. This could endanger the lives of the crew.

Some defence experts argue that the risks are balanced by the fact that India would have a nuclear submarine. But even disregarding threat of leakage of radiation, the submarines are not modern enough; they are known to create so much noise that they can be easily detected by enemy forces.

The Soviets, in recent years, have developed and deployed modern submarines like the Oscar class that could have been handed over. As one official said, even Soviet satellites in the Eastern Block shy away from

taking the "Chernobyl" class of submarines. It is then asked whether the submarines are being palmed off to India knowing fully well that there would be no protests?

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Heavy Water Plant Closed After Blast, Fire
Bn181558 Delhi Domestic Service in English
1530 GMT 18 Mar 88

[Text] The heavy water plant in Baroda was shut down this afternoon following an explosion and a fire. Official sources said the explosion followed a leakage in the ammonia plant of the project. The fire was controlled in an hour. No casualty of radiation hazard has been reported.

Hazira Heavy Water Project Reported in Full Swing
51500130 New Delhi PATRIOT in English 6 Feb 88 p 5

[Text] Baroda, Feb 5 (PTI)—The Hazira ammonia extension project, with an effective production capacity of 110 tonnes of heavy water per annum, at Hazira near Surat, about 150 kms from here, is expected to be commissioned by 1990, project sources said.

Work on the project, estimated to cost Rs 223 crore including a foreign exchange component of about Rs 74 crore is on in full swing.

This plant is based on "monothermal ammonia hydrogen exchange process" using synthesis gas from the adjacent ammonia plant of the Kribcho fertiliser unit as feed stock, the sources added.

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Breakthrough in Radiation-Resistant System Reported
51500132 Madras THE HINDU in English
1 Feb 88 p 3

[Text] Karaikudi, Jan 31—In developing a build-coating system for nuclear power stations and marine structures the Central Electrochemical Institute (CECRI) here has achieved a major breakthrough in the field of radiation-resistant protective coating systems.

Addressing press persons the institute Director, Prof. K. I. Vasu said the most important properties required of the paint coatings used by nuclear establishments were resistance to irradiation, low contamination by contact with radio nucleides, good decontaminability, low activity and good corrosion protection. The BARC has been importing these paints because of the difficulties faced in getting the material due to delay in shipment and quality control besides high cost.

The Power Plant Engineering Division of BARC, Bombay, felt the need for the development of an Indian substitute for the system and approached the CECRI for developing it.

Three-Coat System Paint

Undertaking the work on sponsorship basis the CECRI has come up with a high-build three coat system paint comprising zinc sodium silicate primer or zinc ethyl silicate as primer, epoxy-based paint (under coat) and epoxy-based titanium dioxide (finishing paint). The paints have passed the BARC tests as stipulated by the Atomic Energy Commission.

Prof. Vasu said the CECRI had developed the know-how for the paints based on indigenous raw materials. The foreign exchange savings envisaged amounts to Rs. 3 crores a year.

Other Uses

The coating system developed by the CECRI was essentially for nuclear power plants. Its use is not exclusive as a radiation resistant coating. It is reportedly useful as a high building paint for marine structures.

Prof. Vasu said this zinc-rich paint gave cathodic protection to the metallic structures for several years against aggressive marine corrosion and tests conducted at the CECRI, Mandapam found its performance good. The scientists responsible for this development were Dr. S. Guruviah and Messrs. M. Sundaram, V. Chandrasekaran, P. Jayakrishnan, K. Raghupathy and V. Ganesa Sarma. The National Research Development Corporation of India, New Delhi, has presented an award to the CECRI.

It has been suggested that the capital outlay for a plant capable of producing 100 tonnes of this high-build paints will be Rs. 30 lakhs.

Prof. Vasu told pressmen that it was proposed to convert the Mandapam unit into a testing and research centre. The Madras unit of the CECRI was developing an anti-corrosive system for automobile. The institute in Karaikudy was also developing a paint using water as primer.

Prof. Vasu also spoke of a system under study by which automobiles for instance could be "electro-painted". Under this system automobiles need not be painted with brush or spray. Instead the job will be done by electrodes.

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India Rare Earths Plant 'Safe' From Radiation Hazards

51500131 Madras THE HINDU in English
1 Feb 88 p 6

[Text] Bombay, Jan 31—The Alwaye plant of the public sector Indian Rare Earths, has been declared "safe" from the alleged radiation hazards by the expert committee set by the Government of India.

The committee under the chairmanship of Dr. M. S. Valiathan, Director, Chitra Tirunal Institute of Medical Science and Technology, Trivandrum, said the most appropriate radiation control methods were adopted in the plant and the radiation exposures received by the workers were well below the maximum permissible levels recommended by the International Commission on Radiological Protection (ICRP). Improvements in process technology had not only reduced radioactivity levels in the marketable product (rare earths chloride) but had also reduced substantially the radioactivity discharges in the Periyar river.

With the commissioning of the effluent treatment plant, still further reduction had been attained. This could be considered a substantial achievement in the effluent management by IRE, the committee said.

Mr. R. K. Garg, chairman and managing director, IRE released the committee's report.

Level of Discharges

The committee noted that the "systematic environmental survey of the Periyar river water since 1974-1986 provides adequate information to reassure that the level of discharge from the plant during the normal operations has not significantly contributed to the RA (radium) 228 levels in the river water. The RA 228 content in the river is already at 10 per cent of the maximum permissible concentration (MPC) for drinking water for general public, which is contributed by the geochemical processes from the catchment area of the river. Although industrial discharges enhance the radium levels in the river water, they are well below the MPC for drinking water, even at locations in close proximity to the out-fall," the committee added.

Groundwater Contamination

On the possible groundwater contamination arising from the "mixed cake" storage facility in underground trenches by IRE the committee noted that the fortnightly samples from the bore wells provided around the trenches, indicate that "there is no enhancement of RA 228 levels in the groundwater around the trenches, indicating assured safety of the mixed cake storage facility up to the present time".

The committee has, however, suggested that "serious considerations must be given to find alternative sites outside the plant site for prolonged storage of the mixed cake".

About 782 tonnes of rare earths chloride could have been dumped into the sea during the year 1958-59 which would have discharged 2.6 Ci (curie) of RA 228 into the sea. Considering the large dilution factors available and possible co-precipitation and sedimentation of RA 228 in sea water, "the discharges would not have added significantly to the existing levels of RA 228 in the sea water and hence would contribute only negligible radiation exposure from this source by way of uptake by marine organisms and its consumption by population," according to the committee.

Incidence of Cancer

A comparative study by the committee revealed that the incidence of cancer and cardio-vascular disease related deaths among IRE workers using age specific rates (ASR) was on a par with the national average.

In the absence of ASR available for Kerala, the committee concluded that "there is no evidence to demonstrate that the workers at the Alwaye plant have a higher risk for cancer than that in the general population".

In the case of heart diseases, ASRs for cardiovascular disorders are not available. The committee, however, expressed a general observation that the incidence of cardiovascular diseases was shown to be associated with the smoking habits and secondly due to hypertension and diet. "It is a well-known fact that smoking among industrial workers is highly prevalent which is reflected in the incidences and fatalities from cardiovascular diseases in the age group of over 45 years. Any systematic analysis will require to take these well recognised predisposing factors into consideration before implicating the work environment as the primary cause," the report said.

Infertility

About infertility among the IRE workers and genetic disorders among their off-springs, the committee said it is well-known that around 10 per cent of the married couples in the general population are sterile. In the case of the workers, around three per cent were reported to be sterile. There is no valid scientific reason to conclude that these are in excess or could be radiation related.

The report concluded that "considering the work assignment of the individual, the birth order of the defective children and closeness of the related marriages, the genetic disorders reported among the off-springs of IRE workers are the effects of inbreeding and are not likely to be radiation related".

The report called for a long-term prospective study comparing the health status of IRE workers with that of an appropriate chemical industry not involving radiation exposure.

The committee submitted its report in November last year.

The other members of the committee were: Prof. N. Balakrishnan Nair, ex-officio secretary and chairman of the State Committee on Science, Technology and Environment, Kerala Government, Trivandrum, Dr. B.D. Gupta, Prof. and Head of the Department of Radiotherapy, Post-Graduate Institute of Medical Education and Research, Chandigarh and Dr. K. Sundaram, former Director, Bio-Medical Group, BARC, Bombay.

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PAKISTAN

Expert Says 'To Go Nuclear' Only Option
51004721 Karachi MORNING NEWS in English
14 Feb 88 p 5

[Text] Islamabad, 13 Feb—Pakistan in a situation in which it is at present placed has one and only one option that it must go nuclear. The present position demands that Pakistan should reduce not increase its conventional forces and create a deterrent nuclear force including battlefield nuclear weapons.

This observation has been made by a Pakistani expert on defence matters—Mr S.M. Ali in a detailed article appearing in the magazine—NEW HORIZON ON LONDON.

He said such a step by Pakistan will not only ensure Pakistan's security but would also release substantial resources for the rapid economic and social development of the country. Over and above this would also greatly help in the normalisation of relations between India and Pakistan and herald an era of peace and stability in the region.

Giving comprehensive reasons as to why Pakistan should go nuclear vis-a-vis India's attitude towards Pakistan since its very establishment, the author said ever since the loss of Pakistan's Eastern Wing and the creation of Bangladesh India's goal has been to establish its hegemony over Pakistan. To this end, it has created a formidable war machine, established a vast network of defence industries and developed the atom bomb. That India's nuclear arsenal is aimed primarily to achieve overwhelming military superiority over Pakistan is clear also from a statement made in 1981 by K. Subramaniam, a high ranking military adviser to the government of India in which he said that India had to build a nuclear bomb not only to achieve military superiority over Pakistan but also to ensure that India would not be ignored by the United States.

Comparison

Giving a detailed comparison of some key elements of the military power of Pakistan and India, the author of the article said India has 1.8 times as many tanks as has Pakistan, more than twice the combat aircraft, more than six times the transport aircraft, India has also 60 armed helicopters whereas Pakistan has none. In the navy it has two aircraft carriers, 23 frigates and 33 corvettes against nil in Pakistan. In addition to substantial quantitative superiority, India has ever great qualitative superiority, as far as its military hardware is concerned. The Soviet Union has not only supplied India with the most sophisticated military hardware but has also transferred the technology and helped India with the establishment of production facility for the most advanced military hardware, such as MIG-27 aircraft, T-7 tanks and submarines etc. As a result India has become self-sufficient in most items of military equipment and credit for it must be given to the planners in India and to India's ally—the Soviet Union.

India's strategy he said is to build up its own military power to the maximum and spare no effort to keep Pakistan as weak and vulnerable as possible.

India-Israel Link-Up

The article said India's link-up with Israel is motivated by the same consideration. India considers Pakistan to be the main obstacle to the achievement of its hegemonic ambitions in the Muslim world. Once Pakistan is out of the way, most Muslim states in the Gulf and the Middle East will be a piece of cake for India. A strong, stable and prosperous Pakistan is therefore the best guarantee for the security, sovereignty and independence of these states, the article added.

A stable, strong and secure Pakistan is also all the more necessary not only for the sovereignty and independence of the Gulf and the Middle Eastern Muslim states but also for the security of the Gulf oil on which the economies of the West and Japan are heavily dependent. Consequently the creation of a creditable defence capability by Pakistan is therefore not only Pakistan's problem but also the problem of the Muslim states in the Gulf and the Middle East as well as of the West and Japan.

Referring to the nuclear nonproliferation policy, the author described it as a myth. He said America and its Western allies not only did not prevent Israel from building a nuclear arsenal but actually helped it do so by turning a blind eye to its illegal activities. The subject falls into perspective by the story of how Israel built its nuclear arsenal.

Giving an analysis of the bitter experience of the past the author said that the right thing for Pakistan to do in the present circumstances is to decide not to accept any foreign aid in future which tends to compromise its sovereignty and damage its self-respect. The amount of

present foreign aid is not so big that it cannot be generated indigenously. All that the government needs to do is to take the people into confidence and seek their cooperation. Alternatively the government could approach its friends in the Muslim world who would almost certainly be happy to provide more than the aid at present being given and more important, extend it with grace and without strings.—PPI

/9604

Commentary Alleges Pakistan Using Any Means To Develop Bomb

46240013 New Delhi JANSATTA in Hindi
27 Jan 88 p 4

[Excerpts] Reports of new materials for the construction of atomic bombs reaching Pakistan because of the collusion between the West German firm, Nukem, and a Belgium atomic research center have provoked political furor in both countries. Governments of both countries have said that there is no firm proof that atomic equipment reached Pakistan, but the opposition in the countries have rejected this claim. Leaders of the Belgium Green Party have claimed to have provided definite proof in the case. The Pakistani Government has also condemned it, but in view of its past history of obtaining every possible ingredient for atomic bombs from Western countries, its condemnation appears to be meaningless.

There is little doubt that the Governments of West Germany and Belgium will succeed in weathering the political storm arising from this case. The doubt is really whether, despite the extensive publicity surrounding this incident, Pakistan will have any difficulty in obtaining atomic bomb manufacturing equipment from Western countries. It is no mere coincidence that on 13 January, the day after this case was made public in West Germany, the United States announced a 4 billion dollar military and economic aid package for Pakistan. This happened notwithstanding the fact that only a short time ago a Philadelphia court convicted Arshad Parvez, a Canadian citizen of Pakistani origin, on the charge of attempting to smuggle to Pakistan a special steel needed for making atomic bombs and the American Government concluded that the Pakistani Government was directly involved in the case. What more could Ronald Reagan have done to show his contempt for Rajiv Gandhi. Concerning General Ziaul Haq, this was his biggest diplomatic defeat.

Nukem, a notorious West German firm, and its transport subsidiary, Transnuclear, has been illegally shipping atomic equipment. Last year this matter caused a national controversy which initiated an investigation of the firm's employees. Since that time, reports of the suicide of the manager and an engineer of Transnuclear have created a new sensation. In the course of the

investigation, a fraud of nearly 165 million dollars was revealed. Basically Nukem is a West Germany company but Imperial Smerilg of Britain owns some of its shares.

At this time, the West German government is concerned that its international reputation may be damaged because this is not the first time that charges of smuggling atomic equipment from West Germany to Pakistan have been made. In May, 1987, there were raids on the offices of Lebold-Herice because the nation's well-known newspaper STERN published details on the illegal sale of atomic bomb technology to Pakistan. The Lebold-Herice company does contract work for the multinational atomic company Urenco. In the beginning of 1986, Swiss customs officials seized three instruments along with their manuals that are used for uranium enrichment. It was reported that these instruments were destined for Pakistan. The newspaper also reported that some instruments previously reached Pakistan by way of France, Dubai, and Kuwait.

Pakistani agents in Europe and America are not confined to merely buying weapons and atomic equipment. In many cities Pakistani scientists are stationed to monitor atomic research in Western countries in response to their country's needs and to try to buy equipment and technical information. It should be remembered that before starting work in his own country, Pakistan's foremost nuclear scientist, Abdul Qadir Khan, worked in England's Almore atomic center where he learned the centrifuge technique for enriching uranium. Returning to Pakistan from England, he built an atomic center at Katua which is located 20 miles from Islamabad and Rawalpindi. Qadir Khan has not terminated his contacts with the European nuclear scientists. One and one-half years ago he invited his mentor, Dr Martin Brebars of Belgium, to come to Pakistan to visit the Katua atomic center. Accepting this invitation, Brebars came to Katua in November 1986 and was much impressed by his student, Dr Khan. Brebars gave this Pakistani center which sprawls over many acres, the name "Small Science Town." Nearly 3,000 scientists and technicians work there. Clearly these foreign contacts are proving very helpful in the advancement of Pakistan's atomic program.

Within Pakistan itself, the atomic program is very secret. The public is not provided with any information about its progress or is any debate allowed on the subject. There is no doubt that in Pakistan the pro-atomic bomb lobby is more powerful than India's but it would not be correct to say that there is no opposition to it. The retired air marshal and leader of the Tehriq-e Istiqlal, Asghar Khan who is a firm opponent of the atomic bomb, believes that spending so much money on the bomb will be wasteful. In addition many journalists, educators, and scientists quietly oppose it. They say that as it is, Pakistan is spending 40 percent of its budget on weapons and the military; therefore, the remaining money should be spent on the development of works instead of spending it on the development of an atom bomb. The atomic program is politically useful for Gen Ziaul Haq since it is easy for him to denounce anyone who opposes it as anti-Pakistan and anti-Islamic. It is important that the atomic bomb program suites the military which is the backbone of Pakistan, and which provides it with a new method for continuing control over the country. So far as the masses are concerned, they don't know anything about the program. A few months ago in an interview with a London newspaper, a Pakistani scientist said that over 99 percent of the people do not even know the meaning of the word "radioactivity."

The American decision to release military aid to Pakistan despite its full knowledge of that country's atomic program proves that by taking advantage of the Afghanistan problem, Gen Ziaul Haq has succeeded in blackmailing President Reagan. It appears that the United States has now recognized Pakistan to be on equal footing with Israel where reports of atomic progress are no less dangerous than in Pakistan. In the United States no one can think of stopping military aid to Pakistan. In this context, India needs to seriously re-examine its foreign policy because the Prime Minister cannot now stop Pakistan's bomb merely by increasing the number of his foreign visits and browbeating Indian concern over the Pakistani bomb. At least this much is clear from Reagan's rebuff and the West German controversy.

12286/12223

BELGIUM

Mol, Belgonucleaire Involved in Scandal

51002422a Brussels LE SOIR in French 19 Jan 88 p 4

[Article by Guy Duplat]

[Text] The Transnuklear scandal implicates two Belgian companies: the Center at Mol and Belgonucleaire. The German press has accused them of involvement in Pakistan's atomic bomb. The interested parties have categorically denied this, but it is true that those two companies have ties with the German companies implicated in the scandal, that they have ties with the treatment of plutonium, and that they have had frequent contacts with countries as dangerous as Pakistan and Libya. All of this does not even amount to the beginning of proof of guilt, but it helps to create a climate of suspicion surrounding those enterprises, all the more so as both Belgonucleaire and CEN have been short on contracts and have for several years tried to obtain orders from foreign countries, often "delicate" ones: Pakistan, Libya, Egypt, Taiwan, Korea.

1. Ties with Germany. The ties between the center at Mol and Belgonucleaire and the implicated German companies are numerous. Mol signed an important and fraudulent contract with Transnuklear. At the Mol Center itself, Transnuklear set up the Smet-jet company, which is currently under investigation by the office of the prosecutor of Turnhout. Mol is shareholder in the name of the state in Belgonucleaire, which in turn is a shareholder, together with Transnuklear, in Transnubel, the Belgian company in charge of transportation of radioactive materials. Nukem provided enriched uranium to the BR2 reactor at Mol. Alkem, a subsidiary of Nukem, is together with Belgonucleaire a leader in the manufacturing of plutonium fuel.

2. Leader in Plutonium. Belgonucleaire, which is not involved in treatment technology, is a world leader in plutonium technology. It designed the Kalkar assemblies. It perfected the mixed plutonium fuels, and it owns a plant near Dessel for this type of assembly with plutonium stocks under supervision of the Belgian Nuclear Safety Agency. Another plant of this kind (COM-OX) will be built with the French.

3. Well known in Pakistan. The Belgian nuclear power companies are very well known in Pakistan. For 25 years we have been training civilian nuclear experts. PAEC [Pakistan Atomic Energy Commission] has sent trainees to be trained at ULB, at UCL, at Belgonucleaire, at CEN in Mol, and at Belgatom (45 trainees were given training courses at this company which brings together Belgian nuclear industrialists and which is targeted for export markets). But it is the Pakistani trainees' contract, negotiated in March 1986 by the center at Mol, which has aroused the greatest excitement. The agreement allows for welcoming trainees at the rate of 36 man-months per

year. It involves, according to CEN, nonhazardous technology, but among its Pakistani participants were Messrs Ishfaq Ahmad and Majid, who are said to be in charge of the "weapons" group within the Pakistani military program and of the plutonium separation project for military needs.

In addition to the training of personnel, the Belgians have tried to obtain several nuclear contracts. During the 1970s Pakistan had entrusted the French company Saint-Gobain with the task of building a fuel reprocessing plant for the extraction of plutonium. But France had to give this up under very heavy pressure from the United States. Belgonucleaire's part in the Saint-Gobain project consisted of the construction of a laboratory for metallurgy. A memorandum to Mr De Croo, on a mission to Pakistan in February 1987, specified that Pakistan apparently continued the work on the reprocessing plant at Pinstech near Islamabad and in 1983 apparently requested that Belgonucleaire make recommendations to correct security problems at the plant. "Under formal instructions from the Ministry of Foreign Affairs," specified the memorandum, "Belgonucleaire declined the offer."

On the other hand, Westinghouse-Belgium and Belgatom wanted to make an offer for the PWR nuclear power station in Chashna, but, under pressure from the United States, the offer was withdrawn. However, Belgatom had obtained a contract to study the various offers. In February 1987, a Belgatom representative accompanied De Croo to Pakistan. It is also known that the president of Belgatom, Mr Gaube, was director at Belgonucleaire. ACEC also tendered a bid for a contract to renovate the control room of the Pakistani nuclear power station at Kanupp.

4. With government approval. All those contracts were signed with government approval, because they were never military in nature. In a memorandum to Mr De Croo, Miss Herpels, director at the Ministry of Foreign Affairs, stressed that Pakistan has been trying to acquire an atomic bomb by any means and warned against the progress "which will undoubtedly be made by Pakistan." But she did not see any objection to contracts related to the nuclear power stations under IAEA supervision. On the other hand, there was a very clear "no" for any contracts related to nuclear weapons. Our position, she said, is less strict than that of the United States or the Netherlands, but "Belgium must be mindful not to break off any bonds of nuclear cooperation with Pakistan which make it possible for the country to have some control over and privileged information on Pakistan's nuclear power activities."

FEDERAL REPUBLIC OF GERMANY

Illegal Efforts To Market Weapons-Grade Plutonium Chronicled

51002442 Frankfurt/Main FRANKFURTER RUNDSCHAU in German in two parts [Part I 21 Jan 88 p 14; Part II 25 Jan 88 p 10]

[Article by Alexander Rosnagel: "Dirty Business With the 'World's Most Valuable Substance'"]

[Box] Actually, an expert of the International Atomic Energy Agency (IAEA) headquartered in Vienna, last week still thought that IAEA control was airtight and that the risk was "practically nil" that nuclear weapons-grade material had been diverted from Hanau. This is contradicted by the opinions of other experts—inside and outside of IAEA—who consider airtight control impossible in deals with radioactive material. Bribery, diversions, illicit sales and mix-ups not only in the "decommissioning" of low-level or medium-level radioactive waste, but also in dealing with nuclear fuel and weapons-grade nuclear material. The scandal surrounding the Hanau nuclear firms Nukem, Alkem and Transnuklear throws a significant light on dealing with these dangerous materials and the alleged controllability and peaceful use of nuclear technology. Alexander Rosnagel in his book "The Non-peaceful Use of Nuclear Energy," just published by the VSA Verlag, Hamburg, describes the "dangers of the plutonium business," the subtitle of his book. It contains a list of those known cases where weapons-grade material disappeared from Western enrichment and reprocessing plants. From this latest publication by the constitutional jurist, who teaches at the Darmstadt professional school and specializes in questions of nuclear energy use, we present passages dealing with this black market.

[Text] In the spring of 1977 it was learned that 9 years previously, in November 1968, a shipload of 200 tons of natural uranium enroute from Antwerp to Genoa did not reach its port of destination. According to a statement by EC Commission spokesmen, the West German "Asmara Chemie" had bought the consignment in Brussels from the "Societe General des Minerals" and sold it to "SA Italiana Colori et Affini" in Milan. All necessary authorizations had been granted for the transaction within the EC. On the high seas, however, the freighter "Scheersberg" disappeared, including the uranium. The "Scheersberg" was sighted again later on, but with a new cargo and an entirely new crew.

The whereabouts of the shipment was never completely cleared up. It is assumed that the uranium was taken to a third country, probably Israel. It is also puzzling that the merchandise was evidently paid for, yet the buyer never turned to the police concerning prosecution of a case of fraud, or to an insurance company for loss at sea.

In April 1974 it was discovered in India that, from the nuclear power plant Jaduguda in Bihar, uranium (of unknown enrichment) with an official value of \$2.5 million had been systematically diverted, smuggled to Nepal, and secretly transported from there to Hong Kong where it was taken over either by the Chinese or Pakistanis. Previously, in October 1973, Dr. Swapan Sarkar had disappeared, a scientist who had worked at the Jaduguda plant. His wife assumes that his disappearance is connected with the uranium smuggling. On April 21 1974, five persons were arrested in a private home in Jamshedpur and about 3.5 kg of uranium in plastic bags was recovered. Two of those arrested had been employed at the Jaduguda nuclear power plant. Indian authorities believe that the people involved had diverted uranium for 2 years and smuggled it abroad; that the entire operation was motivated by financial gain, and that it was backed by international organized crime.

In 1971 the president of Hydro-Jet Service Inc. in Texas was offered a bribe of \$50,000 per month if he made the installations of his company available for the enrichment of half a million pounds of stolen uranium ore.

Livingstone reports that in 1977 two European businessmen made contact with a raw materials dealer in Washington and offered him about 115 kg of highly enriched uranium at a price of \$2,650,000 per kg, more than 30 times the official market price.

In July 1981 six persons were indicted in Paris for international smuggling of uranium fuel rods.

Atomic Energy and Greed

As the above-mentioned cases show, there have been several black-market activities in the past. But they remained isolated cases. So far, they have not brought about a black market as exists for weapons or drugs. They were predominantly carried out on orders of a handful of states, less so by criminal or terrorist groups. True, nuclear weapons and weapons-grade material have been offered, but probably not actually traded.

It must be assumed that with the increasing use of nuclear energy, incentives and opportunities will also increase. In addition, there are some indications which make one fear that in future, a nuclear black market could become established beyond its present level. The nuclear underworld would thereby also increase the risk of nuclear terrorism. A nuclear black market would offer a further method for nuclear weapons or bomb material getting into the wrong hands.

Because of the interest of many state and nonstate powers in uranium and plutonium as fuel and weapons material, a strict nonproliferation policy could particularly increase the pressure on developing a nuclear black market. Therefore, situations are thinkable in which acquisition of a nuclear option and corresponding know-how might eliminate the more costly course of buying

nuclear reactors and development of the corresponding infrastructure. In this manner the difficulties could be avoided of having to camouflage one's own nuclear program as "peaceful" vis-a-vis international controls. It could also lower the risk that a hostile power prevents the obvious build-up of a nuclear capability through appropriate measures—as Israel, Iran and Iraq have shown with their raids on the opposition's nuclear facilities, and Libya, Pakistan and India have considered doing.

In the United States and Europe, there is at present intensive work on laser enrichment procedures. Tested enrichment procedures are already available for uranium, which are continued commercially since they could lower enrichment costs. Laser isotope preparation for plutonium is still in the development stage. The United States plans to build a pilot plant in Idaho Falls in 1990. Through isotope separation, the shares of the uranium isotope U-235 and the plutonium isotope Pu-239, both important for weapons purposes, can be increased to such an extent that commercially useable uranium can be turned into highly enriched bomb uranium, and reactor plutonium into weapons plutonium.

To the extent that laser technology is developed and becomes a saleable commodity, the danger grows that large groups or states will also use it for their nuclear armament. Laser enrichment installations are relatively easy to operate and conceal. Nonweapons grade uranium and plutonium could then become interesting even for ambitious nuclear weapons programs.

Still under the Shah, Iran had the U.S. firm Liscem build a laser enrichment plant for uranium with four experimental lasers and imported it to Teheran in October 1978. Laser expert Jeffrey Eerkens had founded this small enterprise with Iranian money after ERDA had prevented delivery plans of his previous employer. The installation, which theoretically can produce 15 kg of highly enriched uranium—the raw material for a nuclear bomb—within 90 days, today is at the disposal of the Khomeyni regime.

Since plutonium is not traded on every accessible free market, its value is difficult to estimate. Livingstone calls plutonium the most valuable substance in the world, at best surpassed by interferon. He lists its official price in 1982 as \$100,000 per kg. The Office of Technology Assessment listed the price in 1977 as \$20,000 per kg. Nukem manager Hackstein, in a hearing of the Hesse Parliament in 1984, listed the valid price of one kg of highly enriched uranium as about DM140,000, and Kankleit transferred this price undisputedly to plutonium, also.

However that may be, the black-market price for plutonium will be many times higher than the regular price. The substitution purpose of the diverted plutonium will probably be decisive for the obtainable price. It would thus depend on the investment costs which a state has to expend in order to get at the bomb material through a

nuclear program camouflaged as "peaceful." Kankleit assumes that even the most primitive procedure—a natural uranium procedure with graphite reactor—would incur costs per available kg of plutonium above the official plutonium price by a factor of 10 to 1,000. Based on the price of DM140,000 mentioned in the hearing of the Hesse Parliament, between DM10 million and DM1 billion could be demanded on the black market for 10 kg of plutonium, depending on purity, chemical form and actual circumstances.

These figures are by no means unrealistic. Even for the delivery of conventional weapons such as 25 209 AH-IG Cobra helicopters, the members of the international weapons smuggling ring indicted in Italy in 1984 had demanded a total of \$147.4 million, and \$43 million for 10 Leopard tanks. For the three nuclear bombs they had demanded \$924 million, and \$1.78 million per kg of plutonium, a total of \$60,572 million for the 33.9 kg.

The existence of a black market and the prices obtained there constitute a very great temptation for criminals as well as insiders. Employees could be bribed or blackmailed by criminal organizations, or could act in their own financial interest. Even taking into consideration the usual hiring controls, in view of the sums involved in this business it is difficult to imagine that the psychological blocks in employees with access to plutonium will stand up in every case to suitable material incentives.

The turnover possible in illegal dealings, and the many times greater profit margins, could in the future also tempt the managers of nuclear firms. They would definitely have greater opportunities to organize and conceal the diversion and smuggling of plutonium through manipulation of measuring instruments, bookkeeping tricks, issuance of false papers, and similar measures. Some people consider this method the most probable form of further spreading bomb material.

As examples in the past have shown, this possibility cannot be ruled out. The part played by the then-manager of NUMEC in the disappearance of at least 94 kg of weapons-grade uranium has never been cleared up. German scientists and firms have cooperated with Pakistani and Argentine nuclear authorities and sent deliveries, although they knew or could have known that they were contributing to the build-up of a nuclear weapons capability of these countries.

So far, a regular international black market has not sprung up. But there are some international networks independent of each other where illegal dealings with fissionable material, results from research and development, and nuclear equipment took place in order to put certain countries in a position of becoming nuclear weapons states. Transactions known from the past do, however, provide all the components necessary for a

diversion and black-market situation. If demand, sensitive installations and materials and, thus, the opportunities and temptations increase, a functioning nuclear black market can easily be created from these components.

1. A black market needs the possibility of withdrawing weapons-grade material or other black-market goods from state and international control.

In May 1985, an employee of the Alkem plutonium plant, by falsifying accounting vouchers tried to conceal the fact that Alkem was handling 12 kg of plutonium more than was allowed under its authorization. According to the Federal government, the perpetrator simply made a mistake. The management stated that the authorized maximum amount was exceeded only "for a few hours." The manipulation was only uncovered, however, during the monthly routine comparison of Alkem ledgers with those of state custody which is housed in the Alkem bunker (FRANKFURTER RUNDSCHAU, 25 April 1985).

In the mid-70s, 680 kg of plutonium oxide from the Hague, which Alkem was not permitted to store and process in Hanau since it would have exceeded its authorized processing quantity of 460 kg of plutonium, went into interim storage at Belgonucleaire in Belgium for two years, without authorization and with false labeling for "analytical purposes" (SPIEGEL, Nr. 43/1986).

In June 1987, in an outlying storage of the RBU firm in Hanau 25.53 kg of lightly enriched uranium oxide pellets were discovered in a discarded transport container. According to the investigation by the management, the uranium pellets "had accidentally been stored temporarily" outside the control area 2 years ago, and then had been forgotten. No one could explain how the disappearance of such a large quantity could remain undiscovered in a control system which, according to its own claim, kept track "down to the last gram" (FRANKFURTER RUNDSCHAU, 23 and 26 June 1987).

2. In order to process or produce weapons-grade material, information is needed which cannot be procured officially.

In the spring of 1987, the Cologne State Attorney's Office investigated two authorized signatories of the Leybold-Heraeus GmbH who, at the end of 1963, allegedly passed on the production plans for components of a nuclear technical installation to a Swiss firm without the necessary authorization. It cannot be ruled out that with these plans, components for a uranium-enrichment plant were produced in Switzerland and delivered to Pakistan (FRANKFURTER RUNDSCHAU, 30 April 1987).

3. In order to provide the black market with material and information, under certain circumstances it may become necessary to bribe employees of the nuclear industry.

The new business manager of Transnuklear, a subsidiary of Nukem in Hanau, shortly after taking office in February 1987 had uncovered illegal accounts of the firm's capital in Switzerland and lodged criminal complaints of fraud, breach of trust, and forgery of documents against some of his own employees. According to the investigations of the State Attorney's Office, during the past 4 years more than 100 employees of nuclear power plants and energy supply enterprises had been bribed with this money, at least DM6 million. The money had been diverted at Transnuklear with falsified vouchers and paid out to customers as "useful expenditures," if they provided Transnuklear with transport orders for radioactive waste. The bribery affair also touches upon the security area. Among others, a main department head in charge of radiation safeguarding and security, was suspended in Biblis for taking bribes (FRANKFURTER RUNDSCHAU, 29 April 1987).

4. Weapons smugglers have already appeared on the scene as middlemen who have the necessary contacts with potential buyers of nuclear material. These cases indicate that a nuclear black market could develop on the network of the illegal international weapons market. Furthermore, the already established delivery relations between Western, and particularly German, firms and interested states could be expanded for illegal nuclear deals. Some of these states will be described below.

5. All those states which have already tried to get nuclear information and material, even by illegal methods, must be considered potential buyers, as well as those states and groups which feel themselves forced by such behavior to also pursue nuclear armament.

6. Lastly, the material or information must get to the buyer via cover firms and circumvention. This is no insurmountable difficulty in the international trade with weapons and nuclear equipment.

In March 1985, Albrecht Migule was sentenced by the Freiburg magistrates' court to 8 months' probate and a fine of DM30,000 because, between 1977 and 1980, he exported an installation worth DM13 million to Pakistan without the necessary permit and in violation of Article 34 of the Foreign Trade Law. With delivery of this installation to the laboratory and technical center Dhera Gazi Khan, guarded by the military, Migule's firm "Chemical Engineering Services-CES Kalthof GmbH" has probably contributed to the building of Pakistani nuclear bombs since the installation serves the production of uranium hexafluoride, the starting material for enrichment to nuclear weapons-grade uranium. German authorities became aware of Migule's illegal Pakistan deal only through a tip by the American CIA. Migule had distributed the delivery over years in 62 different truckloads, carefully mixed in with other export cargo, and had declared them as "machines and equipment."

In October 1984, Lizrose Ltd. of London ordered from Arbed-Saarstahl the special steel which is essential for uranium centrifuges. Since Lizrose Ltd. and its manager Inam Shah are considered the European headquarters of Pakistani buyers of nuclear material, German authorities were informed by Western intelligence agencies and stopped the sale. Two weeks later, Lizrose again ordered the steel from Arbed—but this time through steel dealers in London and Cologne. In June 1985, Arbed delivered to the latter 880 kg of steel bars whose diameter of 150 mm corresponded precisely to those centrifuges in which uranium is enriched. The steel was first sent in the direction of London, was redirected in Bremen to Hamburg and there addressed to "Technical Equipment" in Islamabad, a cover firm of the Pakistani nuclear project. The steel was paid for by Inam Shah in cash, the consignment notes and transportation invoice went to the Pakistani embassy.

In mid-July 1985, the USSR shipped 53 special steel containers with 6.8 tons of heavy water to Switzerland which were to be redirected to eight European countries. But they received new consignment notes in Zurich. Rohstoffefuhr GmbH, a subsidiary of Alfred Hempel GmbH and Co KG, had them flown to the United Emirates. There they were loaded into an Air India plane and transported to Bombay. Two weeks later, in August 1985, the Druha reactor in Bombay, India's largest research reactor, was put into operation which until then had a deficit of heavy water. India can produce plutonium in that reactor. According to the report of a Western intelligence service, Alfred Hempel KG, in order not to come into conflict with German authorities, manages its nuclear deals with China, South Africa and Argentina through Orda AG in Switzerland. In this manner, it is supposed to have delivered 60 tons of enriched uranium, valued at about DM200 million, to South Africa since 1981.

The Duesseldorf regional court in May 1986 sentenced four managers of the armament corporation Rheinmetall to jail sentences between 2 years and 15 months and fines between DM3,000 and DM25,000 for illegal weapons export. They were found guilty of having shipped weapons and production facilities, valued at DM50 million and destined for South Africa, Saudi Arabia and Argentina, to these countries via detours and middlemen in Italy, Spain and Paraguay.

Since they lacked export permits for the countries of ultimate destination and did not want to lose the deals, they had listed interim destinations as the "ultimate destinations" and had obtained the necessary permits for those (FRANKFURTER RUNDSCHAU, 15 April 1986).

In the spring of 1987, there were new investigations of managers of Rheinmetall. They are said to have attempted to export 300 20-mm automatic cannons for DM200 million to Iran which is engaged in a war. They are accused of having arranged with the Norwegian

armament corporation Kongsberg to have the cannons delivered to them, whereby they issue a "final destination clause," but ship the cannons on to Iran via Turkey. The business deal fell through in April 1987 when Norwegian newspapers uncovered the deal (FRANKFURTER RUNDSCHAU, 11 May 1987).

The Karlsruhe State Attorney's Office is investigating Helmut Lang for violation of the Weapons Control Law and the Foreign Trade Law. He is accused of having delivered, in 1985 and 1986, through his firm "Orbit elektronische Vertriebsgesellschaft mbH" missile parts, know-how and electronic equipment in the amount of DM6.5 million to Libya, camouflaged as "technical goods," and to have carried out measurements during missile tests in Libya.

All these cases show that economic motives can overcome scruples to participate in this deadly business. Those employed in nuclear technological installations also were not completely immune to this temptation in the past. It would be unrealistic to assume that in future they would resist the temptation of quick and high profits in every case. Even when such illegal actions are uncovered, the possible punishment is completely out of proportion to the attainable profits.

The high profit margins could also be an incentive for organized crime to participate in international black-market deals. Actually, it is not very likely that organized crime will carry out other nuclear operations which would mean a direct challenge to the sovereignty of the state on whose territory it is plying its profitable trade. For it does not want to endanger that. It is much more likely that organized crime will assume the function of middleman for inquiring states, revolutionaries, civil war parties or other groups below the national level and organize the diversion of weapons-grade material or, with the help of existing contacts of the weapons black market, will establish connections between buyers and sellers.

9917

BW To Halt Future Nuclear Plants, Explore Alternative Energy

51002439a Bonn DAS PARLAMENT in German
22 Jan 88 p 8

[Article by rg: "No More Power Plants in the Southwest"]

[Text] The CDU Land government of Baden-Wuerttemberg (BW) has just finished defining its energy policy for the next few decades. Its basic message: no new power plants until at least the year 2000 and, probably forever after, no additional nuclear power plants. This policy, announced by Minister President Lothar Spaeth just prior to the Landtag elections in March, has a desirable side effect. It puts an end to the 14-year struggle over the construction of a nuclear power plant in Wyhl (southern

Baden). The warning expressed by Spaeth's predecessor, Hans Filbinger, "the lights will go out in 1980," if Wyhl didn't come on line, had long ago proven untenable. Spaeth is now rid of not only the Wyhl nuclear power plant, the construction of which is continually being postponed; he has also done away with the other ten sites which had been carefully reserved since 1985 for construction of conventional or nuclear power plants in the "Power Plant Site Development Plan." This caused great sighs of relief in many communities which had been opposed to it.

Spaeth's decision is based on the first analysis of a 568-page report entitled "Energy Supply Perspectives," which the Land government had ordered immediately following the Chernobyl reactor accident and which has now been completed. It was authored by more than 80 experts under the direction of Professor Dr Alfred Voss of Stuttgart University. The government paid DM1.4 million for this work.

Of the three energy policy alternatives (continue building power plants, stop increasing capacity, or shut down the nuclear power plants), the Land government has chosen the second one for the time being. Spaeth has thus cancelled all undefined transitional models. It is true that the report considers it feasible to abandon nuclear power and still meet requirements. However, apart from occasional shortages, this would entail other, unacceptable disadvantages. Power generating costs would rise by 30 to 70 percent and waste product generation would increase by 300 percent if the BW nuclear power plants were to be replaced by additional coal-burning plants. Thus the available nuclear energy is for the time being considered indispensable and also justifiable. Spaeth dispelled any illusions. For the foreseeable future, he indicated, there was no such thing as zero risk. He did, however, dare to look to the future: if alternative energies were to fulfill the promises which many people attribute to them, the nuclear power plants could eventually be shut down "sometime during the next millennium."

Spaeth conceded that research into alternative energy sources should have been conducted sooner and more energetically. The report indicates that at best about 15 percent of Baden-Wuerttemberg energy requirements could be provided by alternative energy sources until the year 2020.

The fact that Baden-Wuerttemberg can mark time in energy policy matters is largely attributable to massive errors in past energy requirement forecasts. Among other things, the report considers 2 percent economic growth per year feasible, accompanied by a 1 percent increase in energy consumption. The minister president considers this as confirmation of the correctness of his economic policy, which assumes a change in the technological structure, and thus more energy-efficient production methods. Besides, the power plant construction program

in BW has made good progress. With the Neckarwestheim II plant, the fifth and last reactor is to come on line at the end of this year. With a nuclear energy ratio of barely 60 percent, Baden-Wuerttemberg will then produce a large share of nuclear power than the FRG average. In addition, several large coal power plant blocks have started up during the last few years, if for no other reason than to fulfill the "century agreement" (Jahrhundertvertrag) between the coal mining and electrical power industries. Spaeth very specifically expressed his obligation to use coal. He feels however that a more equitable distribution of quotas for other laender is mandatory, because some other FRG laender have been importing much more foreign coal than has Baden-Wuerttemberg. Quantities of coal-generated power have risen in Baden-Wuerttemberg by 39 percent between 1984 and 1986, however, at a cost of greater sulfur and nitrogen pollution. Overall, BW increased its share of domestically produced power from 64 percent in 1975 to 87.5 percent in 1986. Spaeth emphasized France's large energy surpluses, as well as the EC domestic market starting in 1992, which will have a far-reaching impact on energy supply. The report estimates power generating costs for the year 2000 as follows: (pfennig per kWh): nuclear energy 6.5; imported coal 9.4; oil/gas 10.7; German bituminous coal 15.6.

By this summer, the Land government plans to arrive at an "Overall Concept for Renewable Energy Sources." Primarily, this will serve also to coordinate research into alternative energy sources. Efforts are being made to conduct a Solar Forum in Baden-Wuerttemberg which is to include representatives from all of the laender. Finally, several major firms intend to participate in the establishment of a "Center for Solar Energy and Hydrogen Research" in Stuttgart and Ulm. DM21 million is to be spent on this in Stuttgart, DM10 million in Ulm.

The Landtag plans to hold hearings about the report and its impact in February.

9273/08309

Work at Wackersdorf To Continue Despite Land Use Plan Denial
51002439b Munich SUEDEDEUTSCHE ZEITUNG in German 6 Feb 88 p 23

[Article by Rolf Thym: "Construction Halt of Reprocessing Plant Considered 'Entirely Erroneous'"]

[Text] Wackersdorf—The decision by the administrative tribunal to declare null and void the construction project for the controversial nuclear fuel reprocessing plant (Wiederaufarbeitungsanlage (WAA)) has "caused surprise and disappointment" in the German Society for Reprocessing of Nuclear Fuels (DWK). So said DWK Board member Wolfgang Straßburg during a press conference in Wackersdorf. However, he said, the impact of this court decision is being "totally misinterpreted" by opponents of the WAA. Straßburg declared that the

assumption that continued construction of the WAA has now come to an end is "entirely erroneous." Inasmuch, he continued, as the FRG construction code permits continuing construction of the WAA even without a land use plan, work on the WAA site is "proceeding in a legal manner," and the project will "proceed on schedule."

Strassburg described as "erroneous" the statement that the community of Wackersdorf had to decide about the continuation of the WAA construction; the only thing for the community council to clarify was whether it should establish a new land use plan or whether it would consider the WAA an "external enterprise" as provided by law. Should the council decide on the latter solution, Strassburg emphasized that "the Wackersdorf community would then have to agree to every single construction permit." The Schwandorf Land council office would then be required to issue the appropriate construction permits.

The DWK board member also stated that members of his staff had since last fall regularly held "information meetings" with the Wackersdorf community council. After the last meeting early this week, the council was said to have declared that in the future it would participate in decisions concerning the WAA "as provided by law." The DWK believes that before the WAA is completed, about 50 more construction permits will have to be issued.

Strassburg then discussed the notification by attorney Wolfgang Baumann, that by order of opponents of the WAA in the Upper Palatinate a series of motions and lawsuits would be brought for the purpose of stopping construction on the WAA site. According to Strassburg, the DWK considers the "prospect of success for a motion to stop construction of the fuel element receiving depot"—which is already partially constructed—"as being minimal. We are continuing to build." The attorney for the WAA opponents, he continued, would have little hope of bringing construction to a halt on the basis of the FRG Construction Code.

Paragraph 35 of that law states that an "external" nuclear facility is not subject to "public action." Strassburg declared that the "public interest" in favor of the WAA construction can be "easily justified" on the basis of nuclear waste disposal. The DWK, he said, cannot accept the WAA opponents' claim of ground water contamination from normal WAA operations; the rigid safety standards of the facility exclude the threat of any danger to the water.

Shaky Political Consensus

"It is regrettable," said Strassburg, "that political consensus about this facility has become shaky," but that until now "not a single court" had examined and evaluated WAA safety. That was likely to happen, however, as soon as the FRG administrative tribunal in Berlin would refer an examination of the first nuclear regulatory

partial construction permit to the Bavarian administrative tribunal (VGH). On 2 April 1987, the VGH had canceled that first step in the licensing procedure in accordance with the Nuclear Law.

Strassburg indicated that on 26 January the DWK had applied to the Ministry for the Environment for the second partial construction permit under the Nuclear Law and at the same time submitted a new "comprehensive safety report for the entire facility." After 22 February, the safety report would be made public by the Wackersdorf community administration, the Schwandorf Land council office and the Munich Ministry for the Environment. Objections can be made at that time. A date for public discussion would probably be announced for this summer. The DWK, he continued, expects a second partial construction permit to be issued in the fall of 1988. According to the DWK, total investment in the WAA through the end of this year will amount to about DM2 billion.

9273/08309

IRELAND

Irish Not Told About Tests in British Nuclear Plants

51500124 Dublin *IRISH INDEPENDENT* in English
9 Feb 88 p 2

[Article by Tony O'Brien and Tom Shiel]

[Text] Irish Governments were not told about tests carried out in the past at 10 British nuclear plants, similar to the one planned for the Trawsfynydd station, it emerged yesterday.

A Department of Energy spokeswoman said last night: "We were never informed about these tests prior to them taking place."

She pointed out that the Irish authorities had not been informed of the proposed test at Trawsfynydd either. It has been postponed.

In recent days the department had been "made aware" that a number of such tests had been carried out in Britain over the past 23 years.

Tests were conducted at a Scottish plant at Hunterston in 1982 and at British Nuclear Fuel's Calder Hall station in Cumbria in 1986.

Eight other tests were carried out from 1965 during the commissioning of Magnox reactors at Bradwell, Sizewell, Hinkley and Wylfa in north Wales, and on advanced gas-cooled, reactors at Dungeness, Hinkley B, Hartlepool and Heysham.

Meanwhile, Fine Gael leader Alan Dukes warned that Britain's ageing nuclear power plants would pose a constant danger for Ireland over the coming decade.

An entire generation of the installations—such as the controversial Wylfa and Trawsfynydd ones in Wales—were nearing the end of their expected life spans, he said.

Radiation problems for Ireland could only increase in the years ahead, he stressed.

There was now talk of disposing the nuclear-powered engines from obsolete British submarines in the Atlantic.

More money needed to be spent here on equipment to monitor radiation, he told the Young Fine Gael Conference in Galway.

/12232

New Study of Disease Linked to Sellafield Leak Begins

51500125 Dublin *IRISH INDEPENDENT* in English
13 Feb 88 p 7

[Text] A renewed study into disease suspected to be linked to a Sellafield leak in 1957 is being carried out on former students of a second school in Dundalk.

Doctors Irene Hillery and Patrician Sheehan previously carried out tests on girls who attended the St Louis School to explain the high incidence of Downs Syndrome in the town.

It was while carrying out this study that they considered possible links between the high incidence of the disease and a significant leak from the Windscale nuclear plant, since renamed Sellafield.

Now Dr Sheehan is seeking to contact former pupils of the other girls' school in the town, the St Vincent Convent of Mercy, to carry out a comparative study of genetic disorders.

"I am seeking to contact other pupils in the town of the same era with a view to seeing what effects radiation had on them. But it is very difficult 30 years on to contact people," Dr Sheehan said last night.

The Dublin doctor who works with the handicapped in St Michael's House in Kilbarrack, Dublin, worked with Dr Hillery on the original study from 1974 to 1983.

It set out to find links between a flu virus and the high incidence of Down's Syndrome among women in the town. And it was while trying to establish this link that they formulated the theory of the nuclear leak being responsible. The flu link was not proved, however.

/12232

Panel Survey Shows Drop in Post-Chernobyl Radiation

51500126 Dublin *IRISH INDEPENDENT* in English
20 Feb 88 p 3

[Text] Levels of post-Chernobyl radiation in lambs on sale here have dropped dramatically according to the Nuclear Energy Board's latest survey.

All lamb on sale in Ireland is perfectly safe to eat and there is no need for public alarm, the board stresses. Very low levels of caesium were found in lamb being sold across butchers' counters and in slaughterhouses. No animal examined exceeded the 600 becquerels per kilogram safety level, adopted by the EEC to apply to imported foodstuffs.

Out of 184 samples tested, between August and December 1987, 10 exceeded a level of 20 bq per kg and 1, in Oughterard, Co. Galway, measured 476. But less than 4 percent in slaughterhouses showed a level about 100.

Tony Colgan, the NEB's deputy head of laboratory testing, said animals which grazed on higher ground where heather was to be found, generally showed higher levels of radioactivity than those put out to graze on grassland.

/12232

UNITED KINGDOM

Cancer Rate at Naval Nuclear Bases Higher Than Average

51500122 London *THE DAILY TELEGRAPH* in English
17 Feb 88 p 11

[Article by Adela Gooch]

[Text] Servicemen at naval nuclear installations and their families faced serious risks to health, including an incidence rate of cancer considerably higher than the national average, Greenpeace claimed yesterday.

"Health hazards for those working at or living near to naval nuclear establishments include chromosome damage, leukaemias and lymphatic cancer," said a report published by the environmental group.

It added that children of crew members in the nuclear submarine Resolution suffered abnormally high levels of birth defects such as cleft palates.

It quoted a study conducted by the Medical Research Council on workers at Rosyth naval base which found a direct correlation between levels of radiation exposure and the damage done to chromosomes in the blood which can lead to cancer.

"In the vicinity of Rosyth eight cases of leukaemia among the under-15s were found, a rate nearly three times greater than the Scottish average. Six cases of lymphatic cancer in the 15-25 age group were identified where one would be expected."

The report, presented at the launch of a campaign for Nuclear Free Seas, also criticised emergency plans to tackle a reactor accident.

The UK's Involvement in the Naval Nuclear Arms Race, Greenpeace, 30-31 Islington Green, London N1 8XE. L1.50.

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Possible Delay in Manufacturing New Trident Warheads

51500127 London SUNDAY TELEGRAPH in English
21 Feb 88 p 1

[Article by Simon O'Dwyer-Russell, defence correspondent]

[Text] Proposals to spend as much as £500 million modifying two of Britain's four Polaris missile submarines are being examined by ministers because of a possible delay in manufacturing warheads for the new Trident nuclear missile.

Consideration of the plan represents a subtle change in policy by ministers who have maintained that the Polaris fleet could remain operational without extensive modification until the arrival in service of the first Trident submarine in 1994.

According to Ministry of Defence sources, ministers are under pressure to seek Cabinet approval for a Polaris modification as the likelihood of the first two Trident submarines, Vanguard and Victorious, entering service in the mid-1990's with a full complement of about 100 warheads each recedes.

The issue will embarrass the government which placed great store during last year's General Election campaign on the fact that the £9.2 billion Trident missile programme was both within budget and on time.

The Central Defence Staff has reportedly considered whether a modification of Polaris communication systems, submarine-missiles links and nuclear weapons

release procedures to standardise them with Trident systems could enable two Polaris boats to remain in service alongside the two first Trident submarines.

Such a measure would be a stop-gap solution sources stressed. It would be designed to enable Polaris submarines to cover Soviet targets while sufficient numbers of Trident warheads to equip both new submarines were deployed.

Although the Trident submarine construction programme is on schedule, the building of a new warhead factory, codenamed A90, at the Aldermaston Atomic Weapons Establishment has been considerably delayed.

Although the Defence Ministry publicly denies that problems with A90 will delay production of Trident D-5 warheads, senior military sources confirm that delays of at least 2 years may prove unavoidable under current planning arrangements.

This may lead to a shortage of warheads when the first two Trident boats enter service.

The A90 factory was to have been handed over to the Ministry of Defence this year and warhead production was to start there in 1990. Handover is now unlikely before 1990 and A90 will require 2 years' testing before production can begin in 1992.

Ministers had hoped that any delay in the Trident programme would be offset by a so-called "Enhanced Commission Programme" for Polaris.

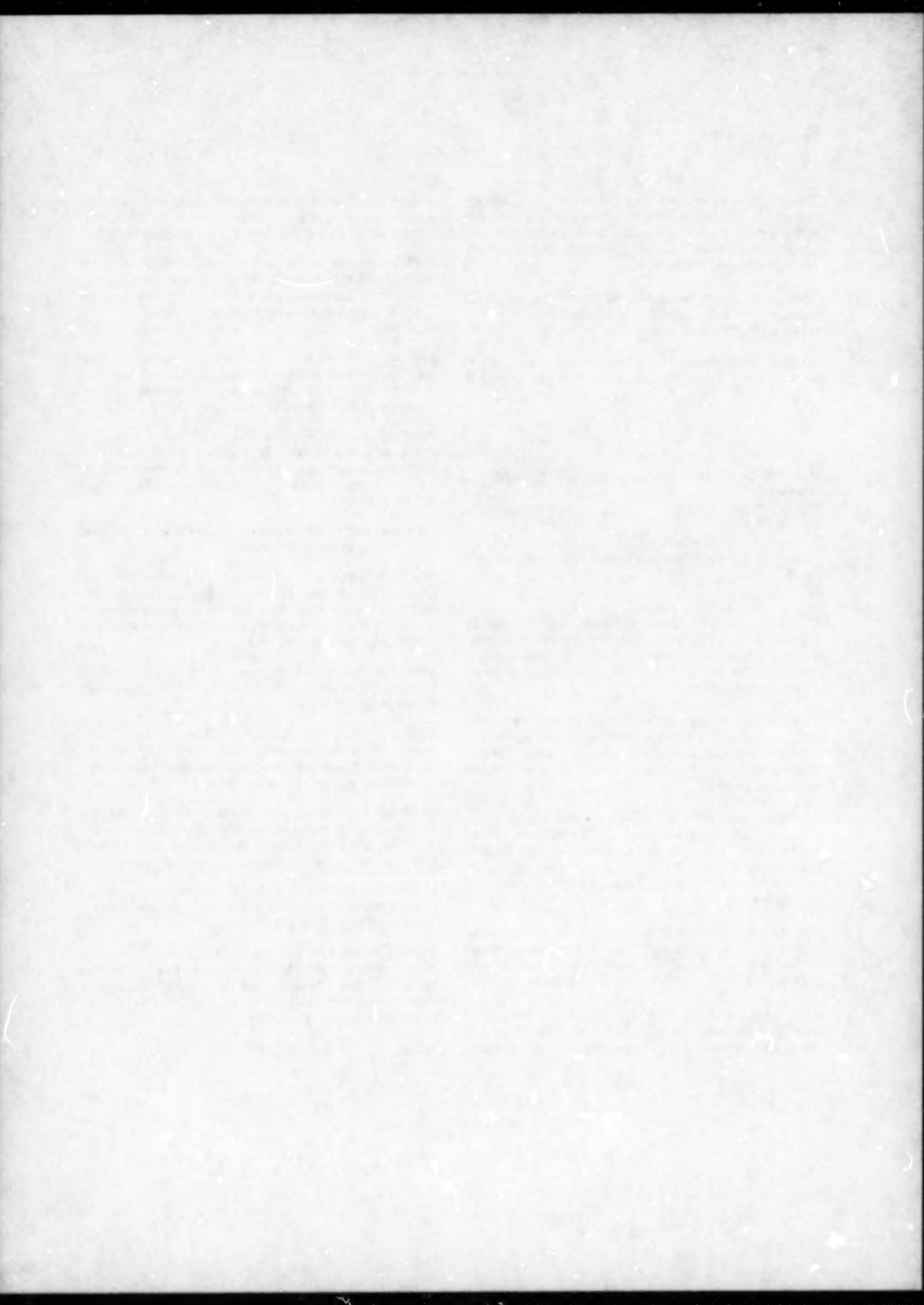
This is a ministry euphemism for keeping the submarines in service without overhaul long after they were due to be scrapped—but they now face strong military representations against such a course.

"Enhanced commissioning means crossing our fingers and hoping that major delays in Trident will not occur and that Soviet capabilities do not advance markedly over the next 5 years," one source said last night.

If ministers approve a modification programme in the coming months, current estimates are that costs may be close to £500 million.

Finding such a sum from the already hard-pressed £19 billion defence budget is likely to prove nearly impossible and Defence Ministry sources last night suggested that use may need to be made of the Treasury contingency fund for the refit project.

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